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Paper No. 23

Application Number: 09/207,972
Filing Date: December 09, 1998
Appellant(s): GARDNER ET AL.

Robert C. Kowert
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed on March 12, 2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 16-19, 21, 23, 30, and 31 do stand or fall together but does not provide reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

6,320,238 B1	Kizilyalli et al.	11-2001
5,880,508	Wu	3-1999
5,994,734	Chou	11-1999

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 16-19 , 21, 23, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kizilyalli et al. (US 6,320,238 B1) in view of Wu (US 5,880,508).

Kizilyalli et al (fig. 1) a semiconductor device comprising a semiconductor substrate (1) and low trap density oxide layer (102) formed on the substrate (col. 6, lines 49-55). A high dielectric constant film (103), such as the metal oxide tantalum pentoxide, is formed on the oxide layer. Ta_2O_5 has a dielectric constant which is greater than 5 or 20 as cited in the applicant's claimed invention. A gate conductor (104) is arranged on the high dielectric constant film. The silicon oxide film is less than 10 angstroms thick (col. 4, lines 31-34). Kizilyalli et al. shows all of the elements of the claims except the low trap density layer (oxide layer) having nitrogen which Wu discloses (col. 1, lines 38-43) to reduce leakage currents in the layer. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the low trap density layer of Kizilyalli et al by adding nitrogen as taught by Wu to suppress leakage current in the layer.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kizilyalli et al. (US 6,320,238 B1) in view of Wu (US 5,880,508) as applied to claim 16 above, and further in view of Chou (US 5,994,734).

Kizilyalli in view of Wu shows all of the elements of the claims except the additional gate dielectric and gate conductor formed between the nitrogen-containing oxide and the substrate. Chou shows (figs. 3f, 3g) a semiconductor device having an additional gate conductor layer (23) and a gate dielectric (22) formed between a

dielectric stack and the substrate (20) to form a non volatile memory device. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor device of over Kizilyalli in view of Wu by adding an additional gate conductor and dielectric as taught by Chou to form a non volatile memory device.

(11) Response to Argument

Kizilyalli et al. was cited by the examiner as the primary reference in the 35 USC 103 rejection. Kizilyalli is a Continuation-in-Part of parent application 08/995,435 (now US Patent 6,548,854 B1) and thus has an effective filing date of December 22, 1997. Kizilyalli also claims priority from Provisional application 60/033,839 which has an effective filing date of December 23, 1996.

The appellant argues that Kizilyalli does not qualify as prior art because the claims of the Kizilyalli child application (US Pat. '238 B1) are not supported by the Kizilyalli parent application (US Appl. 08/995,435). The appellant specifically states the teachings of the 2.2 nm equivalent oxide thickness and the gate electrode 104 disposed directly on the high-K dielectric material 103 (in fig. 1) of the Kizilyalli child are not supported by the parent application.

First, it should be noted that the claims on appeal contain no limitation regarding the 2.2 nm equivalent oxide thickness or the gate electrode disposed directly on the high-K dielectric material. Therefore, whether the parent patent to Kizilyalli (US Patent 6,548,854 B1) supports those limitations or not is irrelevant to the instant claims.

Secondly, the limitations recited in the appealed claims are obvious over the Kizilyalli Patent ('238) in view of Wu (US Patent 5,880,508) as well as the Kizilyalli parent patent and provisional application. The limitations of claim 1 broadly recite a "low-trap-density nitrogen-containing oxide,...a high-K dielectric...arranged upon the nitrogen-containing oxide, and a gate conductor arranged above the high-K dielectric." If fig. 1 of the Kizilyalli parent application were used in the rejection as suggested by the appellant, then the limitations of the appellant's claim 1 would be shown by the oxide layer 3, the high-K dielectric 4, and the gate conductor 6. The Kizilyalli parent application figure 1 shows that the gate conductor 6 is arranged above the dielectric layers. Kizilyalli was only deficient in teaching that the low-trap density layer contained nitrogen. Wu was cited to cure that deficiency and provide motivation for the combination in that the inclusion of nitrogen in a dielectric layer suppresses leakage current. The combined references show all of the elements of the claims and provide motivation for combining the references within the meaning of 35 USC 103.

Hence, the examiner is not relying on any disclosure that has an effective date of the filing date of Kizilyalli '238. That is, the reference relies on the earlier effective filing date of December 23,1996. For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

MEW
May 30, 2003

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